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ABSTRACT

There are numerous reasons why students fail in science. These include lack of interest, truancy, failure to do homework, lack of organizational skills, lack of test taking skills, do not study or lack study skills, cannot comprehend the text, cannot make connections between what they learn in school and the real world, and teaching quality. This report was written with the failing high school science student in mind. How can their journey through science be made more meaningful, enjoyable, and successful? (MVL)

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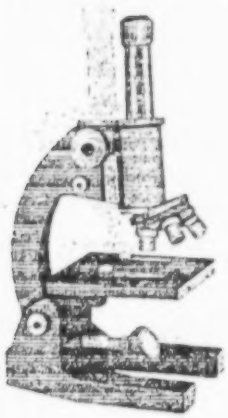
Helping students Succeed in Science



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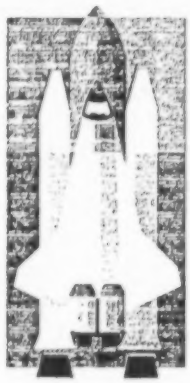

Safiyyah Abdullah

February 13, 2003

Administration and Supervision of Reading Programs

SE 068 276

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Why do so many students fail in Science?

There are numerous reasons why students fail in science?

- Lack of interest
- Truancy
- Failure to do homework
- Lack of organizational skills
- Lack of test taking skills
- Do not study or lack study skills
- Cannot comprehend the text
- Cannot make connections with what they learn in school and the real world
- Teaching quality

The reasons can go on and on. It can become extremely frustrating for students who keep failing science and for the teachers who try to motivate the students but seem to be hitting against a stone wall.

This report was written with the 'failing' high school science students in mind. How can we, help to make their journey through science more meaningful, enjoyable and successful?

As teachers, we should not give up hope, and should hold fast to the philosophy that 'every child can learn', and continue to try to spark their interest by exposing them to a wide variety of learning techniques, and helping them to make connections between what they learn in science and the real world.

Truancy-Unexcused Absences

Truancy has been labeled one of the top ten major problems in this country's schools; it negatively affects the future of our youth. Absentee rates have reached as high as 30 percent in some cities. For example in New York City, about 150,000 students are absent daily. The Los Angeles Unified School District reports that 10 percent of its students are absent daily. Only half of these students return with written excuses.

Absenteeism is detrimental to students' achievement, promotion, graduation, self-esteem, and employment potentials. Students who miss school fall behind their peers in the classroom. This in turn, leads to low self esteem and increased likelihood that at-risk students will drop out of school.

What are some causes of truancy?

Some of the major reasons mentioned by students for skipping school included boredom and loss of interest in school, irrelevant courses, suspensions, and bad relationships with teachers (ERIC Digests ED429334 Dekalb, Jay 1990)

How can schools help to control truancy?

- **Antitruancy Programs**

Schools can implement antitruancy programs.
Peer pressure is a part of a student's life. Peers have an undeniable influence on students' decision to become truant. The results of one study showed that 84 percent of the truants said that their

friends skipped school. Therefore programs that expose truants to other peer groups and other methods of interaction may be effective in reducing truancy.

- **After School Programs**

Implementing after school sports or other programs like a science club, offer students the opportunity to meet new friends, experience a positive and more relaxed atmosphere when compared to the classroom. These activities can foster a sense of accomplishment in the student, which in turn may reduce their likelihood of skipping school.

- **Conducive Learning Environment**

The learning environment is also important to student performance. Teachers must arrive on time and give students frequent praise, interact with the entire class (asking open-ended questions), minimize verbal reprimands and other forms of punishment. And deemphasize competition in the classroom (Rohrman1993)

Truancy is an early warning sign for future problems and should not be ignored; however, it will never disappear entirely. Some students do not attend school because of negative influences in their lives. These students require intervention. They must be made aware that the benefits of regular attendance maybe the difference between a lifetime of burdens and a lifetime of accomplishments.

Teachers and administrators can give students a much better chance of succeeding by addressing related risk factors with an attendance policy that works.

Homework

Homework is important as one of the several influential factors in school success. When used properly it has been shown to have positive effects on both academic achievement and attitudes toward learning. If its importance to learning is actively communicated to the students, the students will be more likely to take it seriously. When the activities in the classroom builds upon the homework assignment, the students will more likely take it serious. Homework provides practice and participation in learning tasks and improves the student's achievement. It is expected that a student's general knowledge and grades would improve along with the increase mastery of basic academic skills, such as reading , writing and spelling. Homework helps the student to develop independent work and learning skills that are critical for success.

Homework may indicate the academic expectations of students. Despite the amount of homework assigned, many students unsuccessful or struggling in school, spend less time rather than more time engaged in homework.

The benefits from homework are the greatest for students completing the most homework and doing it correctly.

How can we help students develop good homework habits?

- **Routine homework assignment**

  Teacher can establish a routine of when and how homework is assigned. The students become used to the routine and it becomes a habit for them to copy their homework before they leave the class. This technique will ensure that the students who have weak organization or direction-following abilities be successful.

- **Supervised Prep**

This task involves the teacher, the student and the parents. There could be **Supervised Prep**. During this time a minimum of two hours are spent doing homework Monday through Friday.

- **Homework Diary**

At the beginning of each school semester, every student is required to have a **diary** in which homework will be written in each day. Parents are asked to sign the student's diary each week. This confirms that the set work is completed.

- **Internet Access**

Students should be made aware of **web sites** where they can visit to get help with their science homework.

- **Homework Clubs**

A **science homework club** could be established so the students have the opportunity to get with their peers and complete their homework.

Great importance should be given to homework and all students should be required to complete it.

Organizational Skills

Developing good organizational skills is a key ingredient for success in school and in life. As teachers, we can help our students put routines and systems in place so they can become more organized. Like the introduction of any new concept, organization must be taught and modeled for students. Setting up a standard system that all students are expected to follow for organizing notes, handouts, corrected quizzes, and homework assignments, will be very beneficial .

How can we help our students develop good organization skills?

- **Color-code**

Color-coding all the material from a particular unit is a unique way to show students how to group information into topics to study. For example, all papers and notes from a particular chapter in a textbook might have a green check at the top of each paper with papers from the next chapter blue.

- **Pair Check**

Another technique is to **pair students** and have them organize each other's notebooks and check to see if anything important is missing. To show the importance that is placed on an organized notebook, a grade should be assigned to it.

- **The use of long and short term calendars**

Teaching students the use of **long and short term calendars** can improve their ability to plan study time, organize test dates, and plan special activities. The more they are encouraged in class to use calendars, the more skilled they will become.

- **Keep organized notebook**

Teacher can help student keep track of papers by organizing them in a binder or note book. The purpose of the notebook is to keep track of and to remember the material for each day's classes and to organize the material later to prepare for tests and quizzes. Use dividers to separate class notes, or color code notebook.

- **Designated study time**

Students should know that a certain time every day is reserved for studying and doing homework. Even if the student does no have homework, the reserved time should be used to review the day's lessons, read for pleasure or work on an upcoming project.

With consistency and care the teacher can help the student develop organizational skills which can be used as a stepping stone towards success.

STUDENT DAILY WORK CHART

ASSIGNMENT	GRADE	DATE	ASSIGNMENT	GRADE

Test Taking

Teachers can teach students test- taking strategies to help them become skillful at taking tests and at managing different kinds of tests and test questions they will encounter throughout their lives. Test taking is one of the gates students must pass through as they advance through school. It is therefore vital that the techniques be taught to them. Once they become aware of their strengths and weaknesses regarding certain kinds of test and responding to certain kinds of questions, they are better able to take control of their learning needs. This would reduce the stress level with which students enter the test.
Knowing different test-taking strategies would give the students more courage and boost their confidence.

Strategies are provided for answering multiple- choice and constructed response questions as well as for questions based on diagrams, data tables, and graphs.

How can we help students develop good test-taking skills?

- **Strategies for Multiple -Choice Questions**

1. Always read the entire question, but wait to read the choices.

2. Carefully examine any data tables, diagrams, or photographs associated with the question.

3. Underline key words and phrases in the question that signal what you should be looking for in the answer. This will make you read the question more carefully. This strategy applies to questions with long introduction.

4. Try to think of an answer to the question before looking at the choices given. If you think you know the answer, write it on a separate piece of paper before reading the choices. Next read all the choices and compare them to your answer before a decision. Do not select the first answer that seems correct. If your answer matches one of the choices, and you are quite sure of your response, you are probably correct.

5. Eliminate any choices that you know are incorrect. Lightly cross out the numbers for those choices on the exam paper. Each choice you can eliminate increases your chances of selecting the correct answer.

6. If the question makes no sense after reading through it several times, leave it for later. After completing the rest of the exam, return to the question. Something you read on the other parts of the exam may give you some ideas about how to answer this question. If you are still unsure, go with your best choice.

- **Strategies for Questions Based on Diagrams**

Most times multiple-choice and extended-response questions include diagrams or pictures. Usually the diagrams provide information needed to answer the question. The diagrams maybe realistic or they maybe schematic. Schematic drawings show the relationships among parts and sometimes the sequence of events that occur in a system.

1. First, study the diagram. Ask yourself what the diagram is about and what it shows you. Read the title or description provided, if there is one.
2. Second, read the question.

- **Strategies for Questions Based on Data Tables**

Most data tables contain information that summarizes a topic. A table uses rows and columns to condense information and to present it in an organized way. Rows are the horizontal divisions going from left to right across the table, while columns are vertical divisions going from top to bottom. Column headings name the type of information included in the table. Sometimes different categories of information are listed down the left-hand column of the table.

Before attempting to answer any questions based on the data, go through the following steps.

1. Find the title of the table. It is usually located across the top.
2. Determine the number of columns in the table and their purpose.
3. Determine the number of rows and their purpose.
4. Read across the rows and down the columns to determine what the relationships are.
5. Now you are ready to read the question

- **Strategies for Questions Based on Graphs**

Graphs represent relationships in a visual form that is easy to read. Three different types of graphs commonly used on science exams are line graphs, bar graphs, and circle graphs. Line graphs are the most common, and they show the relationship between two changing quantities, or variables. When a question is based on any of the three types of graphs, the information you need to correctly answer the question can usually be found on the graph.

When answering a question that includes a graph, first ask yourself these questions:

1. What information does the graph provide?
2. What are the variables?
3. What seems to happen to one variable as the other changes?

After a careful analysis of the graph, use these strategies along with other strategies you have learned:

1. Read the question
2. Read each of the possible answers and consider which is the correct choice by referring to the graph.

Thus teachers can let students in on the secrets and strategies of how to be good test-takers by explicitly teaching test-taking strategies.

Study Skills

What is Study?

Some students think that "study" means just to get ready for a test. When there is a spelling test on Friday they study the words on Thursday night. Actually, that kind of studying is a small part of what study means.

Study means to learn. Whenever you are learning, you are studying, both in school and anywhere else. Some of the ways to learn seems easier than others therefore, you do not think about it as studying. Whenever you are trying to learn you are studying.

What are study skills?

Study skills are the ways or methods of learning. When the student has good study skills more work can be accomplished in a given period of time.

Why are study skills important?

Study skills will help the students become better learners. When students become better learners they will probably find school more rewarding and enjoyable. Also the student will be able to learn outside the classroom.

What some examples of study skills?

Some examples of study skills are:

1. **active listening**
2. **tuning into directions**
3. **reading for meaning**
4. **taking notes**
5. **solving problems**
6. **preparing for test**

How can teachers help students develop good study skills?

Teachers can help students develop good study skills by coaching them and giving them lots of practice.

- **Ways to Listen**

Listening is a study skill. It is one of the most important study skills because listening is a part of almost all activities.
Most people think of listening as something as natural as walking or eating. They don't think of it as a skill that has to be developed in order to do well. We were not born good listeners. We learn to

be good listeners. Students must be taught that listening means to be focused on what they are hearing and trying to make sense of what they have heard.
Teachers can help students become **active listeners** by playing the listening game with them.

Directions for the listening game.
A story will be read aloud only once. Pay close attention to the details of the story. When the story is finished, you will be asked to tell what you have heard. Listen carefully. (The students are not allowed to take notes).

- Steps in Active Listening
    1. **F**ocus
        Look at the speaker. Try to pay attention to what is being said.
    2. **A**sk questions
        Try to figure out what is important by asking questions. Then answer your questions, or see if the speaker answer your question
    3. **C**onnect
        "Make sense" out of what the speaker is saying by connecting ideas with each other.
    4. **T**ry to picture
        Try to see "in your minds eye" what the speaker is talking about

Tuning into Directions

Reading and listening to directions is an important skill. The student should be taught that this skill can be applied to their daily lives in and out of school.

Students should be taught how to read directions carefully, paying attention to all of the directions. If they don't understand they can ask questions.

They should also be taught how to listen to directions carefully. Sometimes all the directions cannot be remembered, at those times the directions can be written on a piece of paper.

Reading for Meaning

Reading for meaning means finding the main idea and supporting details in your reading. The student can be taught the four steps of how to read for meaning.

1. Surveying
2. Reading
3. Mapping
4. Checking themselves

- **Surveying**

The students should be taught how to survey the reading material. Surveying means to look quickly at any heading or titles over the paragraph and then read the first and last sentences. The procedure will allow the student to find out basically what the reading is about.

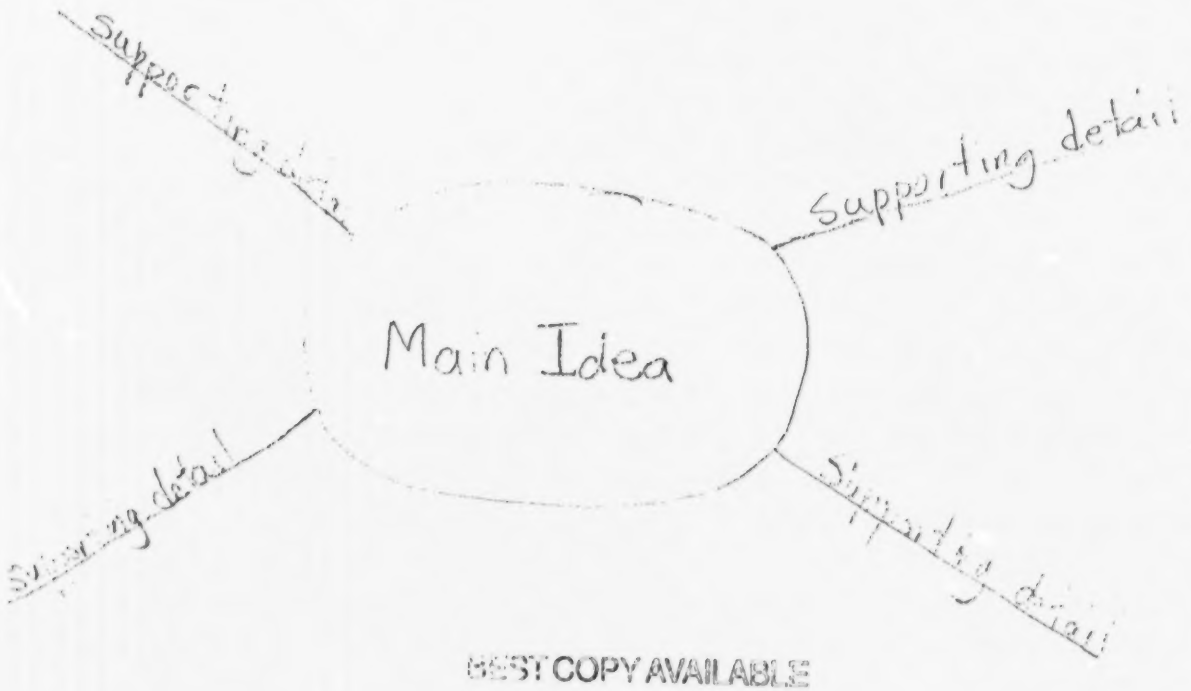
- **Reading**

Once the paragraph has been surveyed the student should have a sense of what the main idea is, the student should then read at their normal rate looking for supporting details to prove, explain or tell more about the main idea.

- **Mapping**

Mapping is a way of taking notes about the reading it helps the student to understand what the main idea is and what the supporting details are.
Steps in mapping.

1. First write the main idea on a line in the middle of the paper. Then circle the main idea.
2. List each Supporting detail on a line that touches the circle around the main idea.



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- **Checking Yourself**

This step involves closing the book and testing yourself to see what you remember.

Another study skill strategy that works wonders is the use of Mnemonics.
These are memory devices to aid in learning. The use of Acronyms to remember long lists can prove to be a fun activity. The acronym does not have to be logical they just have to be remembered.

Virginia Tech 1872

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STUDY SKILL CHECKLIST

First make a print out of this document. Using your printout, read each statement and consider how it applies to you. If it does apply to you, check Y. If it does not apply to you, check N. The purpose of this inventory is to find out about your own study habits and attitudes.

1. __Y __N I spend too much time studying for what I am learning.

2. __Y __N I usually spend hours cramming the night before an exam.

3. __Y __N If I spend as much time on my social activities as I want to, I don't have enough time left to study, or when I study enough, I don't have time for a social life.

4. __Y __N I usually try to study with the radio and TV turned on.

5. __Y __N I can't sit and study for long periods of time without becoming tired or distracted.

6. __Y __N I go to class, but I usually doodle, daydream, or fall asleep.

7. __Y __N My class notes are sometimes difficult to understand later.

8. __Y __N I usually seem to get the wrong material into my class notes.

9. __Y __N I don't review my class notes periodically throughout the semester in preparation for tests.

10. __Y __N When I get to the end of a chapter, I can't remember what I've just read.

11. __Y __N I don't know how to pick out what is important in the text.

12. __Y __N I can't keep up with my reading assignments, and then I have to cram the night before a test.

13. __Y __N I lose a lot of points on essay tests even when I know the material well.

14. __Y __N I study enough for my test, but when I get there my mind goes blank.

15. __Y __N I often study in a haphazard, disorganized way under the threat of the next test.

16. __Y __N I often find myself getting lost in the details of reading and have trouble identifying the main ideas.

17. __Y __N I rarely change my reading speed in response to the difficulty level of the selection, or my familiarity with the content.

18. __Y __N I often wish that I could read faster.

19. __Y __N When my teachers assign papers I feel so overwhelmed that I can't get started.

20. __Y __N I usually write my papers the night before they are due.

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How Can Teachers Help Students Become Successful at Learning from Science Texts?

Students face special challenges when they encounter reading in science, but teachers can use a variety of strategies to help. Science texts are among the most difficult for students to put meaning to, apply the content, and make connections to the real world. Many science teachers argue that it is not their responsibility to teach students how to read, because they were not trained as reading teachers. Helping students with science texts however, is not the same as teaching students to read. Rather, it's helping the students make sense of, and learn from the science text.

Special Challenges presented by the text.

- **Conceptual Density**
  According to Holliday (1991) a high school science text book can include 3,000 new vocabulary terms. Most of these terms are connected to special processes or other ideas that the students need prior knowledge of, in order to make connections and get the real meaning.

- **Requires Special Reading Skills.**
  Some of the skills required in reading a science text may not be applicable to the reading in other content areas. For example, in addition to comprehending text passages, students must be able to read and interpret information presented in unfamiliar ways- not only from left to right, but also from right to left, top to bottom(tables), and even diagonally (graphs). They must be able to decode and comprehend scores of scientific symbols and graphics, and interpret diagrams and figures.
  Students must also learn how to read texts that are organized differently than in other core subjects.

Teachers can incorporate reading and learning strategies that help students

- **Activate prior content knowledge**
- **Master vocabulary**
- **Make sense of unfamiliar text styles**
- **Make connections with prior and present knowledge**
- **Apply knowledge to other settings (real world situations)**
- **Make self assessments**

Activate Prior knowledge.

"Students' prior knowledge is the single most important resource in learning the text" (Vacca and Vacca, 1999) the student actively draws on prior knowledge and experience to make sense of new information. Students will learn and remember what they read when they can make the connection between what they already know and the new material being presented. This prior knowledge and skill prepares them to make logical connections, draw conclusions, and assimilate new ideas.

Strategies for Activating Prior Knowledge.

- **Engagement and Exploration activities.**

These activities prepare students to comprehend later reading assignments. Before students read about the topic, they need certain background knowledge. The teacher can prompt students to recall what they know by asking questions about something related to the topic that students are familiar with. Students' responses reveal what they know, misconceptions that they have, and gaps in their understanding. The teacher can use the information obtained from the students about their knowledge of the topic to confront misconceptions, and develop hands-on and minds-on activities, some of which can include making observations and collecting data. Consider, for example, a science lesson on the structure and function of DNA. Before students read this lesson, they need certain background knowledge. The teacher can prompt students to recall what they know by asking, "Why do judges order men to take DNA tests when confronted with a questionable baby?" or "Why are DNA test results helping so many convicts to get out of prison?" The teacher can further ask students to share any other information they might have about DNA.

- **Graphic Organizers**

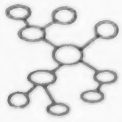
Graphic organizers are visual presentations of the material being learnt. They include charts, diagrams, and pictorial presentations that allow students to organize data into manageable and comprehensible blocks. When graphic organizers are combined with thinking skills and cooperative learning, they become powerful instructional tools. There are many graphic organizers which can be used during pre-reading, reading and post reading activities

Graphic Organizers to . . .

Brainstorm	Analyze	Reflect	Display
Sunshine Wheel Concept Web Mind Map	Venn Diagram Ranking Ladder Fishbone Diagram Sequence Chart Cross-Classification Chart	Right Angle	Pie Chart Target

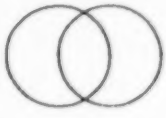
Array of Graphic Organizers

Sunshine Wheel



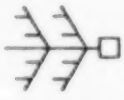
Concept Web

Mind Map

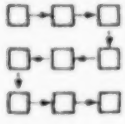


Venn Diagram

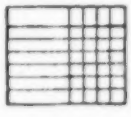
Ranking Ladder



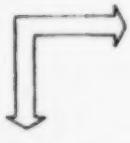
Fishbone Diagram



Sequence Chart



Cross-Classification Chart



Right Angle

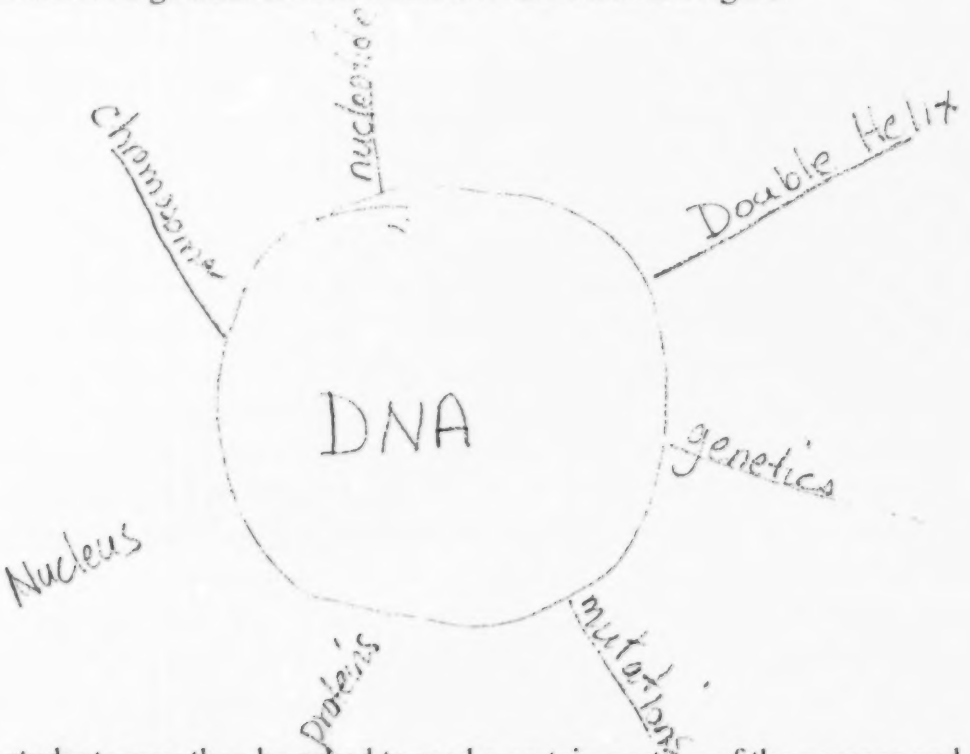
Pie Chart

Target

- **The Sunshine Wheel**

The sunshine wheel, also called a concept wheel, is a useful tool when brainstorming and activating the students' prior knowledge about a topic. This organizer, which consists of a wheel with lines extending outwards like sunshine rays, can be used to collect ideas from students . As the ideas related to the concept are being generated, they are recorded on the lines radiating from the circle.

For example, when introducing the topic DNA, the teacher begins by activating the students' previous knowledge of DNA in the world around them- paternal DNA testing, using DNA testing to prove the innocence or guilt of a person, using DNA testing to identify abnormalities in unborn babies. Next the students brainstorm the attributes of the word that comes to mind and arrange them around a center as shown in the figure.



The students may then be asked to read a certain portion of the passage and compare the ideas presented in the wheel to the ideas presented in the text. This gives the students a chance to compare their ideas with the text, to add new ideas, and to clear up any misconceptions they might have had.

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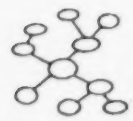
- Concept Web



The concept web, also called an attribute web or semantic map, consists of a set of linked bubbles or circles. It is particularly useful for brainstorming and generating ideas for concepts that have topics and subtopics or that have major and minor themes. This graphic organizer is an excellent way to show the connections between ideas. The generated ideas are then joined by lines to the main idea as a way of showing their relationship.

- Mind Map

The mind map combines logical organization of concepts with a highly creative process. Mind mapping was developed by Tony Buzan (1974) as a way of engaging all of the brain's functions and capturing the 'big picture' through pictures. This organizer uses the idea of the right and left brain theory (Sperry, 1968). Getting the words on the paper is primarily a left-brain activity, and it often limits one's ability to see the big picture. The right side of the brain is used to form images that represent the words. This allows us to see the whole concept as the sum of its interconnected parts. Mind mapping, is therefore useful to show ideas in a visual form. It can also be used to show the organization and relationships among the ideas .It can be used to display notes in a way that allows students to recall the major portions of information at a glance

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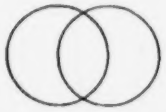
- **The Venn Diagram**



The Venn diagram was developed by John Venn. It consists of two or more intersecting circles, each representing a word or concept. The characteristics that are unique to a word or concept are recorded in its corresponding circle; the characteristics that are shared by two words are recorded in the intersection of the corresponding circles. The ability to compare and contrast requires both convergent and divergent thinking. The Venn diagram in a useful organizer to show the similarities and differences of two or more items.

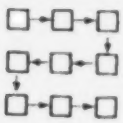
- **The Ranking Ladder**

As the name indicates, this organizer looks like a ladder. It is used to rank or priorities a set of data. The item of the highest priority is listed on the top rung of the ladder. The item of the least priority is listed on the bottom rung.

- **The Fishbone Diagram**

This organizer looks much like a fish bone. It is mainly used to show cause and effect relationships. The problem, or desired effect, is written in the box that forms the head of the fish. The possible causes are arranged along the bones, or ribs.

- **Sequence Chart**

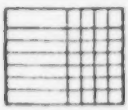


A sequence chart, sometime called a flowchart or storyboard can be used to organize data to illustrate a chain of activity. This organizer is useful any time that information has to be organized into a sequence or to show the relationships between the parts of a process or items in a group. Many cause and effect relationships cannot be attributed to a single cause but rather to a chain of events. The students first write all of the events on self-sticking removable notes and then manipulate them to arrive at the most likely sequence.

The sequence chart can also be used in conjunction with the fishbone diagram to identify possible causes and then arrange their sequence. For example, a student doing an action report on global warming would have a number of causes to examine. Once the causes have been identified, they cam be sequenced into a chain of events using a sequence chart. Arranging the causes sequentially often shows an emerging pattern. This may allow one to predict what will happen if events go unchecked and put solutions in place to head off the problem.

Sequence charts can also be used to show the relationships between parts of a process or items in a group. When it is used in this manner it is called a flowchart.

- **Cross-Classification Chart**



This organizer, also called a cross-classification grid, takes the form of a number of intersecting horizontal and vertical lines. It is used when cross-referencing two classes of information in order to make a decision about them. One class of information is listed in the left-hand column of the grid, the other in the column heading across the top row.

- **Right Angle**

This organizer is arranged around two lines of a right angle. The items arranged in the horizontal lines represent the facts about an event or topic. The items shown in the vertical line represents thoughts, feelings, reactions, or predictions about the event or topic.

The right angle is useful when we want students to change the direction of their thinking. The point of this organizer is to help students see other view points. It maybe used by students as a reflective tool to examine their thoughts and feelings about an event or process. The rationale for this organizer is that in order to concentrate on feelings, one first needs to write out the facts, making them explicit, so that they can be set aside.

- **Pie Chart**

Pie charts are used for showing how the parts relate to the whole. The circle or pie, represent the whole entity or unit, and the individual 'slices' represents segments, or fractions, of the whole. In biology, pie charts can be used to represent the shrinking rain forest, animals and plants found in the school neighborhood, or how many different factors contribute to acid rain.

- **Target**

This organizer consists of three concentric circles. It can be used to indicate or judge the merits of ideas or solutions to problems by shading the appropriate circle. A form of self-assessment or by the teacher in place of a more traditional successful solution would be bull's eye, a near miss would be the middle circle, a definite miss would be the outer circle, and completely off target would be the area outside all of the circles.

The target also can be used to provide students with a visual assessment of their work without resorting to the usual letter grade or percentages. It is useful to all subject areas and for a wide variety of situations. It can be filled in by the students as grade.

Graphic organizers have all the elements of brain-compatible learning. They are seen by most students as enjoyable, low stress, high interest, useful, and creative. They engage the whole-brain approach to learning and allow students to construct meaning for themselves. Graphic organizers are adaptable for all ages and across all areas of the curriculum. They are a vital part of any thinking skills program. They are fun to learn and relatively easy to implement.

Teaching Quality

As time changes and the trends in education evolve, so must the teachers. It is extremely important that teachers stay current with the shifts in the educational scheme. Preparing students for the 21st century is very challenging because there are so many new "knowledge" available.

If teachers capitalize on student interest and provide self-selection opportunities, students feel empowered about their own learning. This self –awareness of feelings is closely linked to the students' emotional intelligence and its impact on learning. Emotions are the gatekeeper to the intellect (Sylwester 1995). When the students are emotionally hooked, the whole memory system is alert.

When the learning is relevant, when students understand and can apply the information being taught in the classroom to their own lives, the learning takes on a deeper meaning. Once this understanding occurs learning is meaningful and purposeful. When students are interested in knowing something, they are much more motivated to learn. It is in this way that teachers can use the techniques of seeking student choices in learning situations to promote increased the success rate among science students.

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